

Black Root Rot of Pansies¹

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INTRODUCTION: Black root rot, caused by the fungus *Thielaviopsis basicola* (Berk. & Broome) Ferraris, is an important disease of a number of greenhouse ornamental crops. It is aggressively pathogenic on several flowering annual hosts, particularly, *Viola x wittrockiana* Gams ex Kappert (pansy). Other notable hosts include: *Antirrhinum majus* (snapdragon), *Begonia* sp., *Gerbera jamesonii* Bolus ex Adlam (gerber daisy), *Pelargonium x hortorum* L. Bailey (geranium), *Petunia x hybrida* (Hook.) Vilm., *Phlox* sp., *Verbena* sp., and *Vinca* sp. (periwinkle) (Alfieri *et al.* 1993: Farr *et al.* 1989).

PATHOGEN: The fungus, *Thielaviopsis basicola* is a soilborne dematiaceous hyphomycete commonly found as an inhabitant of peat bogs and is often a contaminant of peat-based potting mixes (Ellis 1971; Copes and Hendrix 1995). *T. basicola* possesses a darkly pigmented endoarthritic stage (Fig. 1) and a phialidic stage, *Chalara elegans* Nag Raj & Kendrick (Fig. 2) (Farr *et al.* 1989). Both stages are produced on the host. Copious amounts of the pigmented aleurospores are produced on infected roots, giving them a dark, black appearance. These dark, multiseptate, finger-shaped spores fragment at maturity and can be seen microscopically in infected tissues (Fig. 1).

T. basicola tends to be an opportunistic pathogen, taking advantage of susceptible plants under stressful growing conditions. It is most damaging to pansies during summer greenhouse production when it is difficult to keep temperatures from rising well above the optimum growth temperature of 21 °C. Extreme cool temperatures during plant production as well as drought stress, over-fertilization, or a pH level above 8.0 or below 4.5 can also lead to increased disease incidence.

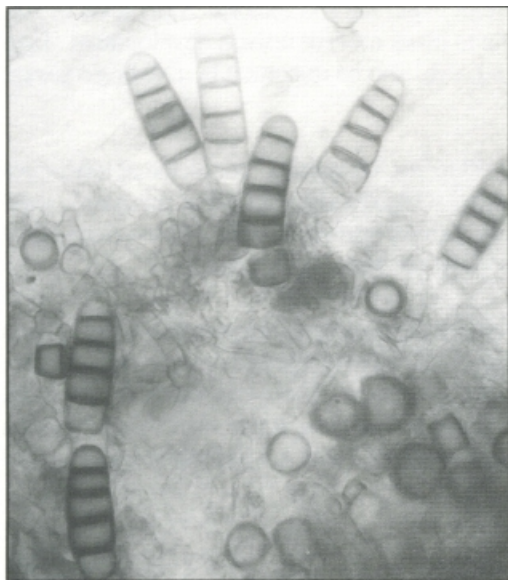


Fig. 1. Entire and fragmented aleurospores of *Thielaviopsis basicola* in a squash mount of infected root tissue.

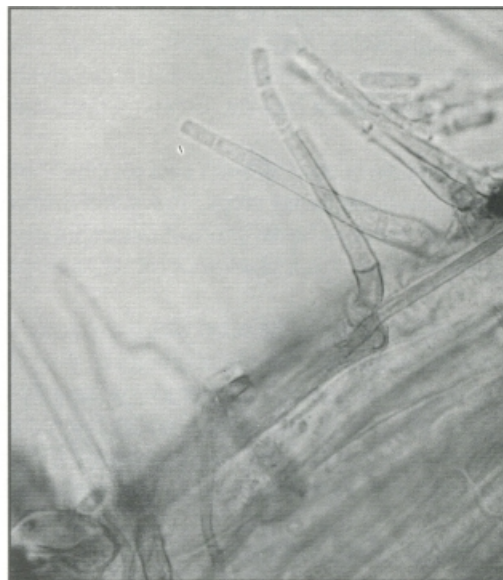


Fig. 2. Phialidic stage of *T. basicola* (*Chalara elegans*) in a squash mount of infected root tissue showing hyaline, brick-shaped endoconidia produced in chains.

SYMPTOMS: Infected pansies initially exhibit slow growth and general unthriftiness. As these plants lose vigor, the foliage begins to develop poor color, chlorosis becomes more severe and lower leaves may rot off. The progression of black root rot leads to general foliar chlorosis throughout the infected plant. Diseased pansies will languish in this condition until they wilt and collapse. Symptoms below ground consist of black lesions and streaks on roots extending up to and including crown tissue at the soil line. Infected root systems of plugs or small

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transplants are often completely destroyed leaving only the tattered remnants of a few main roots (Fig. 3). Sporulation of *Thielaviopsis basicola* is usually heavy in symptomatic tissues of diseased roots.

CONTROL: Control of black root rot begins with good sanitation. When producing pansies or other susceptible crops, new plug and transplant trays should be used. Previously used trays may harbor *Thielaviopsis basicola* and serve as inoculum reservoirs for future infections. Soil "dust and debris" in production areas can be another source of inoculum. To avoid contamination of plants and potting media, greenhouse floors and walkways should be lightly misted with water to cut down on airborne dust transmission of *T. basicola* during cleaning operations.

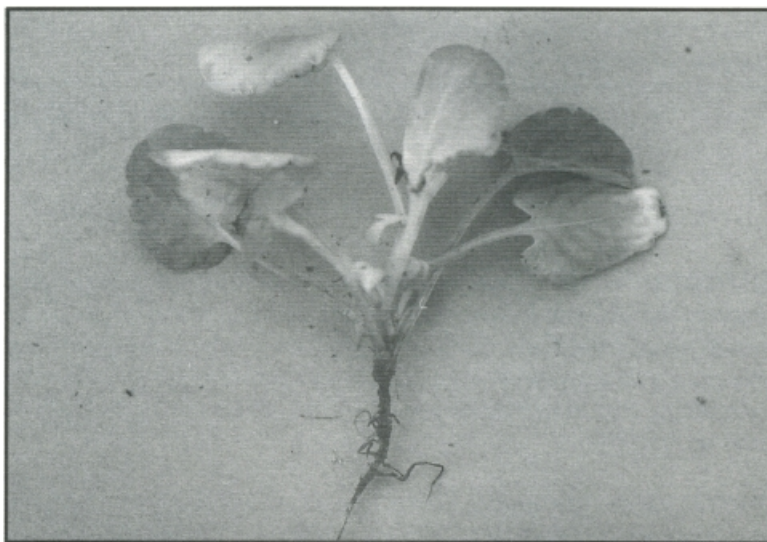


Fig. 3. infected pansy exhibiting black root symptoms typified by severely rotted root system, crown rot, and chlorotic foliage.

Any susceptible propagative plant material entering the greenhouse or production area should be examined carefully for symptoms of black root rot. Isolate suspicious, symptomatic plants from others. Submit an entire, potentially infected specimen to a diagnostic laboratory for confirmation of the disease. Questionable plant material should not be installed in landscapes as the pathogen can build up in the flower beds and render these areas useless for susceptible hosts.

Reducing the severity of black root rot can be achieved by adjusting certain important soil factors. A pH level of 5.6, low phosphorus, high ammonia, and high aluminum can be antagonistic to black root rot disease development. Low levels of certain nutrients, (potassium, calcium, magnesium and sodium), may also be important in avoiding a severe outbreak of black root rot disease (Copes and Hendrix 1995).

Preventative control of black root rot can be achieved by applying Cleary 3336® or Terraguard® fungicide at label rates to symptomless pansy crops. Preventative treatments should be administered at regular intervals and at acceptable legal rates as outlined in the product label (Simone *et al.* 1993). Symptomatic pansies and other infected hosts may show good recovery from black root rot when treated with Terraguard fungicide at the outset of disease.

SURVEY: Pansies infected with *T. basicola* are unthrifty compared with normal healthy specimens and older foliage may show varying degrees of chlorosis. Overall poor color, wilt, and necrosis of older foliage will develop as black root rot disease progresses. Crown rot and sloughing roots can be seen on wilted specimens. Close examination of washed roots will reveal dark lesions and collapsed necrotic tissue. With the aid of a dissecting scope, dark fungal growth (vegetative hyphae and aleurospores of *T. basicola*) and white mycelium associated with the phialidic stage, *Chalara elegans*, may be visible on the outer surface of infected roots.

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